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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/533,212	04/28/2005	Didier Bonnet	RN02138	7334

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EXAMINER

PARSA, JAFAR F

ART UNIT	PAPER NUMBER
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1621

DATE MAILED: 11/21/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

<b>Office Action Summary</b>	<b>Application No.</b> 10/533,212	<b>Applicant(s)</b> BONNET ET AL.	
	<b>Examiner</b> Jafar Parsa	<b>Art Unit</b> 1621	

**-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --**

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 28 April 2005.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 22-42 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 22-42 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All    b) ☐ Some \*    c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)                                | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                       | 5) <input type="checkbox"/> Notice of Informal Patent Application                       |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____  |

## DETAILED ACTION

### ***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

Claims 22-42 are rejected under 35 U.S.C. 103(a) as being unpatentable over Dudgeon et al (USPN 6,433,220) in view of Costantini et al (USPN 6,787,669).

Applicants' claimed invention is directed to a process for producing carboxylic acids by oxidation of a hydrocarbon with oxygen or a gas containing oxygen with the formation of esters in a reaction medium, in the presence of a monocarboxylic acid-based solvent and of an oxidation catalyst, comprising the steps of hydrolysing the esters formed by carrying out a treatment of the reaction medium before extraction of the carboxylic acids or a treatment of the organic

phase derived from the reaction medium after extraction of the carboxylic acids formed.

Dudgeon teaches a process for producing carboxylic acids by oxidation of cyclohexane to adipic acid in the presence of a monobasic acid solvent, by extracting the catalyst from the reaction mixture, outside the reaction zone. Substantially all the unreacted cyclohexane, the majority of adipic acid, and preferably substantially all the monobasic acid solvent are removed from the reaction product. In the case that substantially all the monobasic acid solvent is removed, protic solvent, is added intermittently or continuously in the reaction mixture during the removal of the monobasic acid solvent, preferably by distillation, thus preventing solids precipitation. Dipolar aprotic solvent is then added in the presence of an adequate amount of the protic solvent (the total of dipolar aprotic solvent and the protic solvent constituting a novel combination solvent) to maintain a single liquid phase, followed by a step of extracting substantially all the catalyst in protic solvent. The catalyst extract is preferably recycled to the reaction zone, where the cyclohexane is oxidized to adipic acid. Thus, the novel combination solvent, which is preferably a combination of cyclohexanone with water, allows the dissolution of the reaction product, preferably after removal of the majority of the adipic acid, followed by a substantially complete extraction of the catalyst in water. No catalyst precipitation takes place. See abstract.

Dudgeon teaches that raw materials, including an oxygen containing gas, as well as recycled matter enter the reaction chamber 12 through feeding line 12'. As explained earlier, the feeding line 12' represents in general a number of

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lines or a combination of lines and miscellaneous devices, well known to the art. Preferably, the reaction in the reaction chamber 12 takes place at a temperature in the range of 80-120<sup>0</sup> C. See col. 15, lines 17-24.

Dudgeon teaches that the catalyst is extracted in a liquid form dissolved in a liquid protic phase, and preferably returned to the reaction chamber with or without any further treatment. Separation of the catalyst in solution by liquid-liquid extraction is vital, as it does not have the disadvantages of handling solids within liquids. These disadvantages include, but are not limited to plugging problems, filtration and/or centrifugation necessity, complex transfer equipment, etc. Further, it is critical that the extraction of the catalyst is conducted at an early stage of the process in order to obtain a concentrated solution of catalyst. If catalyst removal is attempted at later stages of the process, after hydrolysis of ester by-products for example, the mixture (from which the catalyst is to be separated) is too dilute and too contaminated with hydrolyzed matter soluble in protic solvents. See col. 8, lines 1-15.

The claims differ from the reference by reciting the oxidation of a hydrocarbon to esters first, and then hydrolyzing the esters to form carboxylic acid, whereas the Dudgeon teaches the oxidation of cycloalknae, such as cyclohexane directly to carboxylic acid. However, Dudgeon teaches that the esters are the by-products of the oxidation reaction of the hydrocarbons and the esters by-prodcut can be hydrolyzed to form carboxylic acids. See col. 8, lines 1-15. It would therefore have been prima facies obvious to the skilled artisan at the time the invention was made to oxidize the hydrocarbons to form ester and then hydrolyze the esters to form carboxylic acids. However, Dudgeon teaches that if

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catalyst removal is attempted at later stage of the process, after the hydrolysis of ester by-products is mixture is too dilute and too contaminated with hydrolyzed matter soluble in protic solvents, bringing very serious difficulties to a catalyst separation in a rather clean concentrated form.

The dependent claims differ in disclosing that the reaction medium is treated with a strong acid carried on or attached to a sulphonic acid resin. Also, the dependent claims require that after the extraction of carboxylic acid the organic phase is recycled to the oxidation step. The dependent claims further require using a transitional metal, such as manganese in combination with a co-catalyst, which is cobalt, zirconium, cerium, hafnium or iron. However, in a similar process Costantini teaches a process for producing carboxylic acid by oxidizing cyclohexane to adipic acid in the presence of a catalyst preferably comprises cobalt, manganese or a mixture of cobalt with one or more other metals, such as manganese, chromium, iron, zirconium, hafnium or copper. See col. 2, lines 20-25. Costantini teaches that the extract can be recycled in an oxidation reaction, either directly or after hydrolysis of the ester. See col. 3, lines 3-5. Costantini teaches that in order to treat the reaction medium, an ion-exchange resin is used for binding the metal cations of the catalyst. They generally have functional groups of an acidic nature or functional groups of a complexing nature. The functional groups of an acidic nature are generally sulphonic acid or carboxylic acid groups. See col. 3, lines 27-32. Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified the process of Dudgeon by including the process steps and the oxidation catalyst, for oxidizing cyclohexane to carboxylic

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acids as taught by Costantini, in order to facilitate the separation of various constituents, which is utilized in the process of oxidizing hydrocarbons for preparing carboxylic acids.

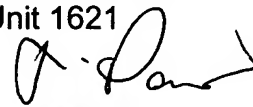
Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jafar Parsa whose telephone number is (571)272-0643. The examiner can normally be reached on 8 a.m.-4:30 p.m. (M-F).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Thurman Page can be reached on 571-272-0602. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

JP  
November 11, 2006

Jafar Parsa  
Primary Examiner  
Art Unit 1621



**J. PARSA**  
**PRIMARY EXAMINER**